JUN 6 1933

SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE •

JUNE 3, 1933

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See Page 344

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The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

A female fly lays about 500 eggs in her lifetime.

The largest crocodiles of Africa are found along the River Nile.

The first talking picture in the Greek language was produced this year, in Turkey.

Although there are no grizzly bears in Yosemite National Park now, the name Yo-semite is an Indian word meaning "the Grizzly."

Among the archaeological treasures in the British Museum is a little glass vase which belonged to King Sargon of Assyria and is marked with his name.

About 16,000 mothers die during childbirth in the United States each year, and physicians have said that at least half these deaths are preventable.

Bears just out of winter hibernation eat sparingly at first, rooting for herbs, roots, and natural foods which their systems crave after the long fast.

"Canned" scenery for grand opera stages can be made on little lantern slides and projected back of the stage on a back-drop screen.

The city of Philadelphia once imported 1,000 English sparrows.

The Navy has developed an anchor chain made of nickel chromium steel.

Abyssinia contains more varieties of wheat than all the rest of the world put together.

Gold leaf of great delicacy was made by Egyptian artisans almost four thousand years ago.

The American alligator got its name by mistake: Spanish explorers mistook it for a great lizard and called it el largato, the lizard.

According to engineers' standards, the humidity in a room occupied by people should be not less than 30 nor more than 60 per cent.

Mount Everest is named for Sir George Everest, who first showed that this peak was separate from Gaurisankar, with which it had been confused.

According to the "rate of exchange" in Canada in 1670, an Indian would trade a beaver for six knives, one-quarter of a pound of powder, and a fathom of tobacco.

WITH THE SCIENCES THIS WEEK

AGRICULTURE
What was this year's wheat harvest in India? p. 347.

ANATOMY
What does the well-dressed young man wear inside? p. 344. *The Machines We Are—R. T. Hance—Crowell*, 1932, $3.

ASTRONOMY
When does Mars pass Jupiter? p. 342.

BIOLOGY
Does evolution ever run downhill? p. 346.
What happens to shipworms when they eat a rope to bits? p. 349. *Marine Structures, Their Deterioration and Preservation—W. G. Atwood and A. A. Johnson—National Research Council*, 1924, $5.

BIOPHYSICS
Can ultraviolet rays cause dead animals to shine? p. 350.

BOTANY
What is gum-jum? p. 348.

ECOLOGY
Where do woody plants predominate? p. 350.

GENERAL SCIENCE
How are the elements distributed in the Century of Progress display? p. 341.
Is the mechanistic doctrine gaining or losing ground? p. 350.
What did Xenophanes see? p. 345.
What is Science's one fashion? p. 345.
What part has science in the Century of Progress? p. 341.

GENETICS
What are genes unable to do? p. 349.

GEOLOGY
What is the principal constituent of corvusite? p. 340.

MEDICINE
Can hayfever caused by fungi be cured? p. 349. *Allergy—W. T. Vaughan—Mosby*, 1931, $4.50.
Can the diseases of middle life be conquered? p. 340.

ORDNANCE
How does the Gerlich rifle squeeze its bullets? p. 348.

PHYSICS
How large a proportion of photons do cosmic rays contain? p. 350.
What is deuton? p. 341.
What is the "Milky Way static"? p. 339.

PHYSICS—PSYCHOLOGY
Can a cricket telephone to his best girl? p. 340.

PSYCHOLOGY
Can an ape be taught the value of money? p. 339. *The Mentality of Apes—Wolfgang Kohler—Harcourt, Bruce*, 1925, $3.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information of the article, but are reference for further reading. Books cited can be supplied by Book Dept., Science News Letter, at publishers' prices, prepaid in the United States.

ASTRONOMY

Radio Impulse Found Coming From Heart of Milky Way

Year's Study of Strange Cosmic "Hiss" Indicates That Its Apparent Source Follows Rotation of Stars

TO THE COSMIC rays, the light of the stars and other detected radiations from outer space, there has now been added a mysterious Milky Way static or radio impulse that seems to come from the vicinity of the very heart of the Milky Way.

Karl G. Jansky, of Bell Telephone Laboratories, discovered this cosmic "hiss" while working with an extremely sensitive receiving set at Holmdel, N. J. Disentangling this particular kind of static from other sorts that are heard in radio sets, Mr. Jansky noted that the hiss was always a little stronger coming from one direction than from all other directions and that this direction of maximum static hiss was continually rotating around the horizon, approximately once a day.

Mr. Jansky made many observations, attempting to check the idea that the hiss had something to do with the sun's position and the earth's daily motion. He discovered that the direction of the hiss progressed slightly in position in the sky with each day. For a year he gathered observations daily, without making any scientific announcement. Apparently the hiss was not following the sun, but something that gained on the sun four minutes a day or a whole rotation of the heavens in a year. This is exactly what the stars do, as every amateur astronomer or star-gazer knows.

Received on Short-Wave

The cosmic static was therefore seemingly hitched to a given place in the heavens or the Milky Way. It is a stream of radio impulses coming from some fixed point outside the solar system in the great aggregation of stars, known as the Milky Way, in which our sun is a mere minor star.

Mr. Jansky's radio was short-wave, tuned to 14.6 meters or 20,600 kilocycles, but he feels sure that these interstellar static impulses will be found all up and down the radio spectrum, probably increasing with frequency in the high-frequency or short wave portions.

The point from which the Milky Way static comes is very near the location of the center of our Milky Way galaxy as determined by Dr. Harlow Shapley, director of Harvard College Observatory. The point is where the plane in which the earth revolves around the sun crosses the center of the Milky Way. It is also the position toward which the solar system is moving with respect to the stars. The astronomical coordinates of the newly discovered radio waves are right ascension 18 hours and a declination of about minus or south 20 degrees. If you want to see where this is in the heavens, look at the Milky Way between the constellations of Sagittarius and Ophiuchus.

What generates the cosmic hiss is as yet unknown, just as the origin of the cosmic rays is unknown after many years of research. The center of the Milky Way is computed to be some 40,000 light years from the solar system and the power of a generating station, measured in earthly terms, would be prodigious, perhaps millions upon millions of times as powerful as any broadcasting station on earth.

Perhaps the cosmic hiss is the by-product of some wide-spread galactic happening, such as transmutation of mass into light, a mighty murmur of atoms disturbed. Mystics may see in the Milky Way static messages from intelligent beings on unseen planets of remote stars, but scientists will not support this view. There has been presented another problem for the future of science to solve.

Science News Letter, June 3, 1933

BOTANY

New Giant Clover Species Found in Northwest

WITH SEVEN leaflets to each leaf instead of the usual three, and big in all its parts, a new giant clover species has been discovered in the state of Washington by J. W. Thompson of Seattle. It was growing on dry sagebrush slopes near the mouth of Swakane Creek, Chelan County, Wash.

Mr. Thompson sent a specimen to the U. S. National Herbarium, Washington, D. C., where it was examined by C. V. Morton. Mr. Morton found it to be a plant hitherto entirely unknown, and therefore gave it a technical description in the *Journal of the Washington Academy of Sciences*. He named it *Trifolium thompsoni*, in honor of its discoverer.

Science News Letter, June 3, 1933

PSYCHOLOGY

Apes Work for "Money" and Spend It in Slot Machines

APES CAN be taught how to use "money" to buy the food delicacies they enjoy, to choose a small white token rather than a larger one with less purchasing power, and even to "hoard" more of the tokens than they can spend at one time and to discard worthless brass checks. They will work just about as hard to earn the "money" as they will for a direct reward of food.

This ability of animals lower in the scale than man to realize the significance of symbols was revealed in Washington when Dr. John B. Wolfe, National Research Council Fellow, reported to the Division of Anthropology and Psychology of the Council experiments he had been making, under the direction of Dr. Robert M. Yerkes, with chimpanzees in the Laboratories of Comparative Psychobiology at Yale.

Poker chips of various sizes and colors were used by Dr. Wolfe as money and he taught the apes to spend these by placing them in a slot machine aptly called the "chimpomat."

This was a difficult task at first. The chimpanzees readily learned to reach for the food at the opening even before the token was placed in the slot. But it was harder to teach them to put the tokens in the slots themselves.

When two animals had learned the

trick, however, Dr. Wolfe allowed the other two to learn from the experienced apes, and they picked it up much more easily.

The chimpanzees will also use the chips and slot machines for other purposes than to secure food, it was found. A yellow chip placed in the proper machine buys the opportunity to play with the experimenter, and a blue chip properly spent entitles the ape to leave the experimental room and go back to its living quarters. The use of the blue chip was learned with greater ease than any of the others, Dr. Wolfe said, and it was selected in preference to all the others by one animal who was anxious to get away from a disliked camera man.

The apes will not play the machines just for the entertainment of seeing them work, however. A brass check which can be inserted in the machines but buys no reward is discarded by the animals as soon as they learn that it is a "plug nickel."

Science News Letter, June 3, 1933

GEOLOGY

New Mineral Shines Like Raven's Wing

CORVUSITE, or ravenstone, is the name which has been given to a newly-discovered mineral from Utah, which has the iridescent luster of a raven's wing. Its scientific name is in reference to the Latin word for a raven or crow, *corvus*. The mineral was investigated by Edward P. Henderson and Frank L. Hess of the Smithsonian staff.

The new mineral contains a high percentage of the rare metal vanadium. It was found in close proximity to the carnotite deposits which constitute the chief source of radium in the United States. Intimately associated with the corvusite deposits are the petrified remains of ancient trees, but what connection these may have had with its formation is not known as yet.

A second newly discovered mineral reported by the Smithsonian Institution scientists is a black, pitchy substance which, however, has a true crystalline structure. It is rich in the now widely used metallic element chromium, and is found on the bark of petrified trees.

The first specimens were called to the attention of geologists by J. L. Riland, a veteran newspaperman of Meeker, Colo., and the mineral has been named rilandite in his honor.

Science News Letter, June 3, 1933

MEDICINE

Medical Research Conquering Diseases of Past Middle Life

Advances in Physiology Are Overcoming Chronic Ills Made Ravaging by Life-Extending Success of Bacteriology

A BRIGHT hope has awakened in the hearts of informed physicians and laboratory investigators that the next years will witness a great acceleration in the control of the chronic diseases of past middle life, those ills which now take increasing tolls due to the life-extending success of bacteriology in controlling the infectious diseases of early life and the dangers of surgery.

That eminent leader in medical research, Dr. Simon Flexner, Director of the Rockefeller Institute for Medical Research, analyzes the present status of the triumphs of experimental medicine in a communication to the current *Scientific Monthly*.

Pasteur, Lister and Koch provided the scientific foundation for present day bacteriologly and operative surgery. They ushered in the era of experimental study of such diseases as tuberculosis, typhoid fever, diphtheria and epidemic meningitis.

Bacteriology and aseptic surgery have written their triumphs into the tables of mortality among infants, children, and adolescents, Dr. Flexner observes, and "in a period of time not too long deferred have led to an increase in the individual expectation of life in the culturally advanced countries of at least twelve years."

Now the science of physiology has had its foundations laid, precisely as the science of bacteriology had to be developed in the earlier years. Dr. Flexner tells us that marked progress in the control of disease has been resumed along this new line. Physiologists have disclosed the functions of the ductless glands of the body. These glands are essential to the maintenance of health and their derangement is responsible for serious and fatal diseases as age advances. It is because of the discoveries regarding the nature of the thyroid, adrenal and pituitary glands and of certain secondary but similar essential activities of other organs such as the pancreas and liver, Dr. Flexner tells us, that increased control is being achieved of certain diseases of past middle life, among which diabetes and pernicious anemia may be singled out for mention. Considerable progress has been made but Dr. Flexner predicts still greater achievements will be made if the growth of science continues unimpeded.

While there is just cause for rejoicing at the achievements, Dr. Flexner warns that there are hard problems immediately ahead to which answers, at least sufficient answers, have not yet been obtained. Cancer, Bright's disease, and diseases of the heart and blood vessels are seriously prevalent and destructive. There is no lack of effort being made to reach a fuller understanding of their nature, origin and control. Dr. Flexner believes that progress is being made.

"The ultimate goal seems, however, still distant," he writes. "There is but one way, I submit, to bring that goal within reasonable hope of being reached finally and that is by continued, unremitting, unobstructed study by the experimental method."

Science News Letter, June 3, 1933

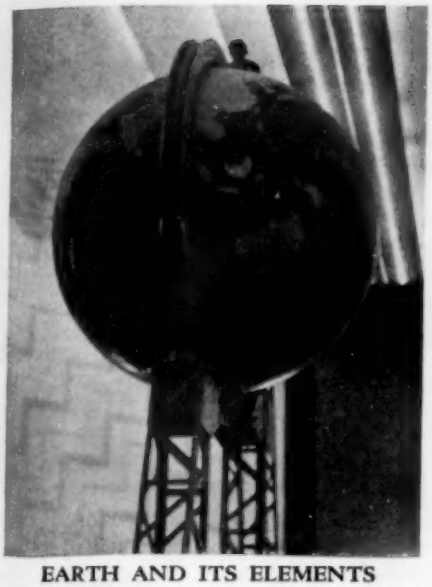
PHYSICS—PSYCHOLOGY

Telephone Message Between Crickets

A TELEPHONE message from a male cricket to a responsive female was described by Dr. R. T. Beatty of the Admiralty Research Laboratory in a recent lecture on the sense of hearing in animals.

In nature, the male cricket rubs his wing casings together for his song, and the female hops toward him in answer to the call. Although it was known that a cricket possesses hearing apparatus in its forelegs, this experiment was devised to prove that other factors of smell, vision or vibration are not involved in the response to sounds. Accordingly the male was invited to chirp into the 'phone. When the call was made, the female cricket rose into the air and settled down beside the receiver.

Science News Letter, June 3, 1933



EARTH AND ITS ELEMENTS

Enter the central portion of the Hall of Science at the Century of Progress exposition and a great globe will be slowly spinning before your eyes, while below there are samples and information on the 93 building blocks of the earth, arranged in the form of the chemist's periodic table. These 93 chemical elements, the basic materials of the world and the universe, have been given a central position in the Century of Progress. Those who learned in school that there are 92 elements are informed that neuton is the one added to the periodic table in the last year. Some of the samples in the display are rare specimens of chemical elements that were totally unknown a few years ago.

GENERAL SCIENCE

Science Theme Carried Out Through 1933 World's Fair

SCIENCE that has remade the world in the last hundred years is glorified at Chicago's Century of Progress exposition.

First of all, the very ground upon which the miles of buildings rest was created out of the shallow waters of Lake Michigan by an engineering operation.

Then for the past three years engineers have been at work designing and rearing the buildings which are to serve for the next six months and then be demolished, much like the settings of a movie city. Yet while it lasts, the Century of Progress city will entertain millions of visitors and exhibit millions of dollars' worth of displays and treasures. It will serve millions of meals. Adequate fire protection must be provided and hundreds of police, guides and other personnel will inhabit the exhibition city during the exhibition hours.

Some of the buildings strike new notes in modern architecture. The bright hues of many-colored paints are spread over the pylons, towers and walls, and unusual lighting effects blaze their contribution to the fair's decorative scheme.

From the hemispherical planetarium at the northern corner to the gigantic transportation hall near the southern end of the exposition's expanse, there awaits the visitor a liberal education in science and its effects on human life.

The Hall of Science, to which the cross-bannered court of honor of the principal entrance leads directly, contains an array of mechanized, self-operating demonstrations and exhibits in chemistry, biology, physics, medicine and the earth sciences. In some cases the visitor or attendant pushes a button and the machine goes through its cycle of demonstrating a basic science principle. In other cases the exhibit methodically carries out its demonstration every few minutes without the prodding of button pushing.

Some of the machines talk their message by means of sound film or phonograph attachments, while others use more prosaic labels in ordinary or transparent lettering. Lantern slides automatically projected are parts of many demonstrations.

Giant electric machines, automatic telephones and switchboards and the thousands of devices developed by science and used in communication or the electrical arts, are displayed in the great halls of communication and electricity.

In the gold-domed federal building and the hall of states with its emblematic facades, Uncle Sam and the state governments show their public service and governmental activities, particularly along scientific lines.

The Adler planetarium, as yet America's only mechanical show of the stars, is a part of the exhibition. In this richly somber dome the astronomical exhibits are contained.

America's agricultural interests are represented by a low, long building decorated in black, red and blue-green.

On Northerly Island, across the lagoon from the Hall of Science, is also the Hall of the Social Sciences, in which exhibits will recall the social consequences of the century of progress and suggest how the problems can be met.

Southward along (*Turn to Page* 344)

PHYSICS

Deuton, Heavy Hydrogen Effective in Atom Smashing

WHEN heavy-weight hydrogen hits atoms things happen.

Introducing "deuton" as a new name for the double-weight hydrogen atom only known to science for a little over a year, Prof. Ernest O. Lawrence of the University of California reported to physicists of California Institute of Technology what happens when the heavy isotope of hydrogen is used as a projectile in smashing various elements.

Only about a month ago, Dr. Gilbert N. Lewis, the famous University of California chemist, supplied Prof. Lawrence and his associates, Drs. Henderson and M. Stanley Livingston, with some deutons.

The atom smashing was done with the aid of potential up to 1,500,000 volts imparted to the deutons with Prof. Lawrence's "merry-go-round" magnetic method of creating high voltages.

Lithium, beryllium, boron, nitrogen, fluorine, aluminum, and sodium gave good results. Transmutations occurred, alpha rays were formed, and probably other processes yet to be examined followed.

The most energetic alpha rays ever seen were produced from lithium. They travel almost fifteen centimeters through air. At this rate of progress one dares not guess what will be achieved in nuclear physics within a few years.

A most momentous experiment is being attempted by Professors G. O. Gibson and Fowler who plan to bombard deutons with deutons in the hope of making them combine into helium.

ASTRONOMY

June Evening Skies

All Five Naked-Eye Planets Will be Treat For Close Observers on Last Day of Month

By JAMES STOKLEY

DURING the month of June the planets and their motions are again the center of interest in the evening sky. This has been the case for several months lately, but now three that have been invisible in the evening are scheduled to make their bow before the month comes to a close. In fact on June 30 all of the five naked-eye planets —Mercury, Venus, Mars, Jupiter and Saturn—will be visible to the keen-eyed observer at some time during the evening.

On the first of June, Mars and Jupiter will be the main characters in this drama, as they have been for some time. During May they were drawing together in sort of a planetary race. All this time the two bodies have been conspicuous in the south, Jupiter, the brighter of the pair, being to the east. At the end of May they were only a degree apart.

This is their aspect as June opens. On the first day of June the moon, then at first quarter, will pass the two planets about two and a half degrees (about five times its own diameter) to the south, making a most interesting spectacle. On Sunday, June 4, the more rapidly moving Mars passes its larger and more brilliant brother, at a distance of only a quarter of a degree (or half a moon diameter) to the south.

The time of closest approach of the two bodies, however, occurs at about 5 p. m., before the sun has set and the planets become visible. When darkness has fallen, they will already have passed, but will still be within less than half a degree of each other. They will also be unusually close the previous night. During the rest of the month they will continue to draw apart and, at the same time, will grow fainter, for both are receding from the earth. But even at the end of June, Mars will be of the first magnitude, and Jupiter considerably brighter, of the minus 1.5 magnitude in the astronomer's brightness scale.

Saturn, next most distant planet after Jupiter, can now be seen in the early morning sky, in the constellation of Capricornus. It rises about midnight, but at the end of June it will appear about two hours earlier. It will then be a little brighter than Mars but not nearly as brilliant as Jupiter. However, its steady glow low in the eastern sky should make it easy to distinguish.

The innermost of the planets, and the most seldom seen, is Mercury, which never gets very far from the sun and at best can only be seen low in the west just after sunset, or in the east just before sunrise. On the second of July it will be at the greatest distance east of the sun that it will get on this revolution in its orbit and may then be perceived with a little difficulty in the gathering twilight. Possibly it might also be picked up a day or two earlier, and thus make another addition to the list of naked eye planets seen in the June sky.

Venus Near Sun

Last of the five planets mentioned, and next to Mercury in order from the sun, is Venus. Because its orbit is like Mercury's, inside that of the earth, it never gets into a part of the sky at a great distance from the sun. A planet like Mars, Jupiter or Saturn, on the other hand, may be, and often is, seen in a position directly opposite the sun, because they revolve in orbits outside that of the earth. But Venus can get considerably farther from the sun than Mercury and is sometimes conspicuous in the evening sky for several hours after sunset. This will be the case in a few months. In the middle of June, Venus will set about an hour later than the sun, before it is entirely dark, but it will be so brilliant—about minus 3.3, or six times the brilliance of Jupiter—that it should be possible to pick it up if you have a clear view of the west. Towards the end of the month it will have drawn farther away from the sun and then will be even more easily seen.

It has already been mentioned that the moon passes Mars and Jupiter, which will then be close together, on the first. On that same day the moon will be at first quarter. On the eighth it will be full. It will be at last quarter, rising at midnight, on the 14th, new on the 22d, and at first quarter again, when it will set at midnight, on the 30th. Thus the evenings will be moonlit from the beginning of the month to about the tenth, and again for the last four or five days of June. On the 24th the moon, then a two-day-old crescent, will pass Venus, about four times its own diameter to the north. It will pass Jupiter, about six diameters to the south, in the early morning hours of the 29th. On the evening of the same day it will pass about the same distance from Mars.

The stellar attractions of the June sky are also of interest. Nine first magnitude stars are shown on the maps, which represent the skies as they appear about 10 p. m. on the first, 9 p. m. on the 15th or 8 p. m. on the 30th. The most

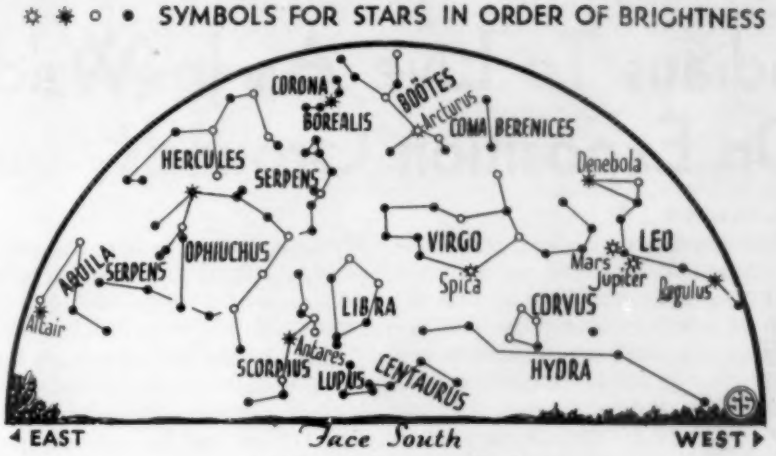
OUTSHINES ALL

Vega, most brilliant star of the June evening skies, appears high in the east in Lyra.

brilliant is Vega, which marks Lyra, and appears high in the east. Below and to the left of Vega is Cygnus, the swan or the northern cross, as it is sometimes called from the arrangement of its stars. The cross is now lying on its side, the long piece pointing southwards. The northernmost star is Deneb, which is another in our list of first magnitude stars. A little lower in the sky, and just to the south of the east point of the horizon, is Aquila, the eagle, with the brilliant star, Altair. Now look towards the south. There, about as high as Cygnus, is visible a star of distinctly ruddy color. This is Antares, marking the constellation Scorpius. The rest of the constellation is a curved row of stars which extend from Antares below and to the left and marks the tail of the scorpion, and a T-shaped group which extends in the opposite direction and represents the scorpion's head.

Scorpius is one of the zodiacal constellations, of which there are twelve, marking the ecliptic, or the path of the sun, moon and all the planets. Immediately to the west of the scorpion's head is a pentagonal group of faint stars, which constitutes Libra, the scales, next along this path. Then we come to Virgo, which has the brilliant Spica shining in the southwest to mark it. And then we come to Leo, the lion, already mentioned because of the presence in it of Mars and Jupiter. The brighest star in this constellation, but considerably fainter than either of the two planets, is Regulus, which is almost directly west. Extending northwards and upwards from Regulus is a row of stars that forms a hook. This is called the "sickle," and the point of the curved blade now points downwards.

Above Virgo is another conspicuous constellation, Boötes, the herdsman, in which appears the third brightest star of the June evening skies. This is Arcturus. Its prominent position, almost directly overhead, makes it easy to locate. It is somewhat brighter than Mars though not as brilliant as Jupiter. Its distance from us is so great that its light, which travels at the rate of 186,000 miles a second, sufficient to take it across the continent in a sixtieth of a second, requires 41 years to reach us. Yet this is one of the closest stars known to astronomers! It is much larger than our sun, the star that we know best, for its diameter is 25,500,000 miles, almost thirty times that of the sun, 864,392 miles. It gives out 112 times as much light.



MARS AND JUPITER

These conspicuous planets are only a degree apart as June begins.

Another interesting thing about Arcturus is that it is the second most rapidly moving of the bright stars. Though often called "fixed stars," in contradistinction to the planets, the stars are continually moving through space. To us on the earth this motion has two components. One is the motion across the sky, which can be measured by comparing the positions of the stars at different times. This is called "proper motion." The other is the motion towards or away from us, which is called "radial velocity."

Star Light Reveals Motion

This can be detected by an analysis of the star's light through the spectroscope. Since the spectroscope is scarcely a century old, determinations of radial velocity are comparatively modern, but the first proper motions were found as long ago as 1718, by a famous astronomer whose name is best known in association with the comet which he studied—Edmund Halley, astronomer royal of England. In that year he announced that Arcturus, Sirius and Procyon (the latter two stars being visible in the winter skies) had changed their positions since they were first charted by the ancients. Of the stars bright enough to be shown on these maps, only alpha Centauri moves as rapidly as Arcturus, and that cannot be seen from the latitude of the greater part of the United States. However, the distance of Arcturus is so great that even this great speed, which amounts to 77 miles per second, will only take it the diameter of the moon in 785 years.

Two other first magnitude stars remain in the June evening sky, but neither are well placed. These are Pollux, one of the twins, Gemini; and Capella, in Auriga, the charioteer. Both are visible in the northwest, close to the horizon behind which they will soon disappear for several months. Capella is really brighter than Arcturus, but because of its position in the sky it now looks considerably fainter. The greater thickness of the earth's atmosphere through which its light has to travel absorbs a considerable amount of it.

One astronomical event of June that is always welcome occurs on Wednesday, the 21st, at 4:12 p. m., E.S.T. This is the summer solstice, which marks the beginning of summer. At that moment the sun reaches its farthest north position in its annual trip around the sky and starts moving southwards once more. On this day it is above the horizon for a greater time than on any other day of the year, and, by the same token, the night is then the shortest. It sets then about 30 degrees north of the east point of the horizon. Thus, in the late afternoon at this time of the year we have the unusual phenomenon of the sun shining on the north side of buildings. The same effect can also be seen in the early morning, if one is up and about at such an hour!

Science News Letter, June 3, 1933

Last summer was so hot in Iceland that there was a shortage of ice there.

From the overlapping vertical photographs taken from above Mount Everest and surrounding country, the British expect to map this mountain wilderness which is nearly impossible to chart by ordinary methods.

GENERAL SCIENCE

Indians To Live As In Wild On Exposition Grounds

From Page 341

the lake front, beyond concession buildings designed to amuse or convince the throngs commercially, is an area devoted to America's aborigines.

Rising to a commanding position is a reproduction of one of America's earliest and most striking architectural developments, a Maya temple. With strange carvings of huge mask heads, great serpents and other elaborate designs, painted brilliant yellow and green, there is duplicated a portion of the Monjas or Nunnery at Uxmal in Yucatan, built by the Maya Indians many years before Columbus discovered America. Within it can be seen some of the most valuable of the Maya treasures loaned by American museums.

In the shadow of the Maya temple five groups of American Indians will live primitive existences as their ancestors did before them. This will be their contribution to the Century of Progress. Nootka Indians from the American northwest will raise their totem poles. Winnebagos in wigwams will represent the woodland tribes. The plains Indians whose existence depended upon the buffalo will be represented by a group of Sioux Indians living in tipis, while the Pueblos will dwell in reproductions of their terraced villages, which were America's earliest apartment houses. Navahos, too, will show the part they played in the old Southwest. For the visitors these Indians will dance their ceremonials and sing their chants.

Close by the Indian villages and the Maya temple are the exhibition buildings of leading automobile manufacturers. Here may be seen the operating assembly line where complete cars are built from piles of parts.

The pageant of a century of transportation will be shown under the gigantic sky-hung dome of the travel and transport building, so large that railroad cars and transport airplanes seem lost beneath it. Along the lake front will be found famous ships of today and yesterday.

Science News Letter, June 3, 1933

ANATOMY

Two Mechanical Men Explain Body's Mechanism

See Front Cover

MECHANICAL men reveal to the visitors of the Century of Progress expedition the physiology and chemistry of the human body.

The famous transparent man, manufactured in Germany, as a life-sized display of the vital organs of human anatomy is a central exhibit in the medical section of the Hall of Science. He is illustrated on the front cover of this week's Science News Letter.

The life-sized model transparent man obtained by the Century of Progress from the famous Hygiene Museum at Dresden has his exterior made of a synthetic transparent material. Heart, lungs, the stomach, liver and other interior organs are lighted in rotation to show vividly to the visitor their relation to the surface of the skin.

An American robot, ten feet high, who speaks and gestures, and explains an illuminated interior view of himself is a part of the chemical exhibit.

"Now ladies and gentlemen, I shall swallow," the chemical robot tells his audience many times each day in exhibiting the mechanical movements of his stomach and intestines by illuminated dynamic pictures of his interior. "You will see the mouthful of food passing down my esophagus. The food is forced down by the contractions of the esophagus. Now you see the swallow entering the top door of my stomach. Watch my stomach contract to churn up the food."

The robot, who is a handsome well-dressed young man except for the fact that his upper garments are pulled aside to show his digestive area, can point to the various happenings within him. He gives practical advice to the audience upon nutrition and the kinds of food that should be eaten.

A talking motion picture provides both the speech and the interior views of the robot, while ingenious mechanisms allow him to wave his arms when he orates.

Science News Letter, June 3, 1933

GENERAL SCIENCE

151-Word History of Science Written on Building Wall

THE HISTORY of science has been written in 151 words of lyric prose and lettered upon the wall of the principal exhibition room of the Century of Progress Hall of Science here for visitors to read this summer.

The text, written by Dr. Henry Crew, formerly professor of physics at Northwestern University and now head of the division of basic science of the Century of Progress, is as follows:

Pythagoras named the cosmos; Euclid shaped geometry . . . Archimedes physics.

Xenophanes gazing upon the Heavens saw them to be one. Copernicus placed central in that one, our shining sun.

In the motions of physical bodies Galileo beheld law; thence Newton and the principle of universal gravitation.

Democritus glimpsed the atomic theory of the structure of matter; Dalton established it.

When in the nineteenth century Lamarck and Darwin formulated the great principle of organic evolution, the science of life was first seen as a cosmic progression of nature.

For the saving of life through inoculation men give honor to Jenner and Pasteur.

The Century of Progress saw Oersted and Faraday set forth, and Maxwell and Hertz advance the theory of electromagnetism.

Through the Labors of Becquerel, of the Curies and of Thomson, to our own day are revealed fragile atoms and electrons.

Plank's quantum and Einstein's relativity theory open new epochs to science.

Science News Letter, June 3, 1933

GENERAL SCIENCE

Quotations Explain Purpose of Science

FROM THE VAST literature of science fourteen quotations have been selected and written upon a wall of the Century of Progress Hall of Science as a concise summary of scientific philosophy. Poets and public men as well as scientists are among those who wrote the collected sentences. The quotations are as follows:

Science and peace will triumph over ignorance and war.—Pasteur.

Man is the interpreter of nature . . . Science the right interpretation—Whewell.

Nature never proclaims her secrets aloud, but always whispers them.—John Owen.

Science has but one fashion . . . To lose nothing once gained —Stedman.

There is nothing so powerful as truth, often nothing so strange.—Daniel Webster.

Scientific education is an essential condition of industrial progress.—Huxley.

If there is one way better than another, it is the way of nature —Aristotle.

The first and last thing required of genius is the love of truth.—Goethe.

Nature is not to be governed except through obeying her.—Bacon.

More important than particular truths is the love of truth.—C. J. Little.

The common experiences of normal people are the matter of science.—H. Dingle.

Reason's voice and God's, Nature's and duty's, never are at odds.—Whittier.

The essence of science is to discover identity in difference.—F. S. Marvin.

Scientific law is a description, not a prescription.—Karl Pearson.

Science News Letter, June 3, 1933

Nineteen of the world's greatest scientists have their names emblazoned on the wall of the Hall of Science. The scientists and the fields of their researches are: Aristole, Biology; Archimedes, Mathematics; Euclid, Mathematics; Hipparchus, Astronomy; Leonardo, Anatomy; Galileo, Physics; Huygens, Astronomy; Harvey, Physiology; Newton, Mathematics; Lavoisier, Chemistry; Dalton, Chemistry; Darwin, Biology; Pasteur, Medicine; Faraday, Physics; Helmholtz, Physics; Maxwell, Physics; Mendelejeff, Chemistry; Rowland, Physics; and Michelson, Physics.

SCIENCE IN REVIEW

Stretching along Chicago's water-front for a distance of 3½ miles and covering 424 acres, Chicago's Century of Progress consists of hundreds of buildings. The Southern (left in picture) end of the exhibition has as its most prominent feature the gigantic travel and transport building with the hanging dome. To the left of this structure are railroad yards where trains are on exhibition. Next prominently to the right are the Chrysler and General Motors buildings housing commercial automobile exhibits. The 31st street overpass (first from left) spanning the railroad and auto boulevard, brings visitors directly to the Maya temple reconstruction. To its right may be seen the wigwams and tipis of Indian tribes on exhibition, while closer to the lake are the tents of the regular army exhibit camp. From this point to the curved bridge leading to Northerly Island, commercial and entertainment concessions are located.

On the island at its left end is the fair's motion picture colony and "Hollywood," next is the horticultural building, and then the electrical and communications buildings. The Hall of Social Sciences is at the foot of the island Skyride tower. To the right of the tower is the hall of states and the federal building. The long, low-lying semi-cylindrical building is devoted to agriculture and on the tip of the island lakeward is the permanent Adler planetarium housing astronomical exhibits. The great Hall of Science is to the left of the other Skyride tower. To its left are four identical buildings devoted to general exhibits.

BIOLOGY

Degeneration

"A Classic of Science"

Not All Evolution is Upward Toward More Complex Forms Some Animals Find Equilibrium While Others Retrogress

DEGENERATION: A CHAPTER IN DARWINISM. By E. Ray Lankester. Delivered as one of the evening lectures at the Sheffield Meeting of the British Association for the Advancement of Science, 22d August 1879. *Published in THE ADVANCEMENT OF SCIENCE, Occasional Essays & Addresses. London and New York: Macmillan and Co.,* 1890. *This is an exact reprint of extracts from the original publication.*

IT IS CLEARLY enough possible for a set of forces such as we sum up under the head "natural selection" to so act on the structure of an organism as to produce one of three results, namely, these: to keep it *in statu quo;* to increase the complexity of its structure; or lastly, to diminish the complexity of its structure. We have as possibilities either BALANCE, or ELABORATION, or DEGENERATION.

Owing, as it seems, to the predisposing influence of the systems of classification in ascending series proceeding steadily upwards from the "lower" or simplest forms to the "higher" or more complex forms,—systems which were prevalent before the doctrine of transformation had taken firm root in the minds of naturalists, there has been up to the present day an endeavour to explain every existing form of life on the hypothesis that it has been maintained for long ages in a state of Balance; or else on the hypothesis that it has been Elaborated, and is an advance, an improvement, upon its ancestors. Only one naturalist,—Dr. Dohrn, of Naples—has put forward the hypothesis of Degeneration as capable of wide application to the explanation of existing forms of life; and his arguments in favour of a general application of this hypothesis have not, I think, met with the consideration which they merit.

The statement that the hypothesis of Degeneration has not been recognised by naturalists generally as an explanation of animal forms, requires to be corrected by the exception of certain kinds of animals, namely, those that are parasitic or quasi-parasitic. With regard to parasites, naturalists have long recognised what is called retrogressive metamorphosis; and parasitic animals are as a rule admitted to be instances of Degeneration. It is the more remarkable whilst the possibility of a degeneration—a loss of organisation making the descendant far *simpler* or *lower* in structure than its ancestor—has been admitted for a few exceptional animals, that the same hypothesis should not have been applied to the explanation of other simple forms of animals. The hypothesis of Degeneration will, I believe, be found to render most valuable service in pointing out the true relationships of animals which are a puzzle and a mystery when we use only and exclusively the hypothesis of Balance, or the hypothesis of Elaboration. It will, as a true scientific hypothesis, help us to discover causes. . . .

Degeneration Defined

Degeneration may be defined as a gradual change of the structure in which the organism becomes adapted to less varied and less complex conditions of life; whilst Elaboration is a gradual change of structure in which the organism becomes adapted to more and more varied and complex conditions of existence. In Elaboration there is a new expression of form, corresponding to new perfection of work in the animal machine. In Degeneration there is suppression of form, corresponding to the cessation of work. Elaboration of some one organ *may* be a necessary accompaniment of Degeneration in all the others; in fact, this is very generally the case; and it is only when the total result of the Elaboration of some organs, and the Degeneration of others, is such as to leave the whole animal in a lower condition, that is, fitted to less complex action and reaction in regard to its surroundings, than was the ancestral form with which we are comparing it (either actually or in imagination) that we speak of that animal as an instance of Degeneration. . . .

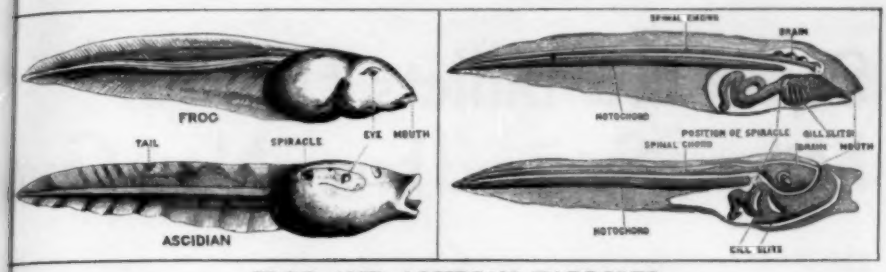
The Nauplius

Amongst these Nauplii—all belonging to the great group Crustacea, which includes crabs and shrimps—is one which gives rise to an animal decidedly degenerate, but not precisely parasitic in its habits. This Nauplius is the young of the ship's Barnacle, a curious stalked body, enclosed in a shell of many pieces. The egg of the Barnacle gives rise to an actively swimming Nauplius, the history of which is very astonishing. After swimming about for a time the Barnacle's Nauplius fixes its head against a piece of wood, and takes to a perfectly fixed, immobile state of life. . . . Its organs of touch and of sight atrophy, its legs lose their locomotor function, and are simply used for bringing floating particles to the orifice of the stomach; so that an eminent naturalist has compared one of these animals to a man standing on his head and kicking his food into his mouth.

Were it not for the recapitulative phases in the development of the Barnacle, we may doubt whether naturalists would *ever* have guessed that it was a degenerate Crustacean. It was, in fact, for a long time regarded as quite remote from them, and placed among the snails and oysters; its true nature was only admitted when the young form was discovered. . . .

The Ascidian

The instances of degeneration which we have so far examined are due to parasitism, except in the example of the Barnacle, where we have an instance of degeneration due to sessile and immobile habit of life. We may now proceed to look at some sessile or immobile animals which are not usually regarded as degenerate, but which, I think, there is every reason to believe are the degenerate descendants of very much higher and more elaborate ancestors. These are certain marine animals, the Ascidians, or sea-squirts. These animals are



FROG AND ASCIDIAN TADPOLES

re similar both on the surface and internally. But one becomes an active, bright-eyed, noisy vertebrate, while the other attaches itself barnacle-like to a rock, sheds its rudimentary spinal column, and vegetates for the rest of its days.

found encrusting rocks, stones, and weeds on the sea-bottom. Sometimes they are solitary, but many of them produce buds, like plants, and so form compound masses or sheets of individuals all connected and continuous with one another, like the buds on a creeping plant.

We will examine one of the simple forms—a tough mass like a leather bottle with two openings; water is continually passing in at the one and out at the other of these apertures. If we remove the leathery outer case, we find that there is a soft creature within which has the following parts: Leading from the mouth a great throat, followed by an intestine. The throat is perforated by innumerable slits, through which the water passes into a chamber—the cloaca: in passing, the water aërates the blood which circulates in the framework of the slits. The intestine takes a sharp bend, which causes it to open also into the cloaca. Between the orifice of the mouth and of the cloaca there is a nerve-ganglion.

My object in the next place is to show that the structure and life-history of these Ascidians may be best explained on the hypothesis that they are instances of degeneration; that they are the modified descendants of animals of higher, that is, more elaborate structure, and in fact are degenerate Vertebrata, standing in the same relation to fishes, frogs, and men, as do the barnacles to shrimps, crabs, and lobsters.

The young of some, but by no means of all these Ascidians, have a form totally different from that of their parents. The egg of Phallusia gives rise to a tadpole, a drawing of which placed side by side with the somewhat larger tadpole of the common frog is seen in the adjoining figure. The young Ascidian has the same general shape as the young frog, but not only this; the resemblance extends into details, the internal organs agreeing closely in two cases. Further still, as shown by the beautiful researches of the Russian naturalist. Kowalewsky, the resemblance reaches absolute identity when we examine the way in which the various organs arise from the primitive egg-cell. Tail, body, spiracle, eye, and mouth agree in the two tadpoles, the only important difference being in the position of the two mouths and in the fact that the Ascidian has one eye while the frog has two.

Now let us look at the internal organs. There are four structures, which are all four possessed at some time of their lives by all those animals which we call the Vertebrata, the great branch of the pedigree to which fishes, reptiles, birds, beasts, and men belong. And the combination of these marks or structural peculiarities is an overwhelming piece of evidence in favour of the supposition that the creatures which possess this combination are derived from one common ancestor. . . . These four great structural features are—first, the primitive backbone or notochord; second, the throat perforated by gill-slits; third, the tubular nerve-centre or spinal cord and brain placed along the back; and, lastly, and perhaps most distinctive and clinching as an evidence of affinity, the myelonic or cerebral eye.

Now let us convince ourselves that these four features exist not only in the frog's tadpole, as they do in all fishes, reptiles, birds, and beasts, but that they also exist in the Ascidian tadpole, and, it may be added coexist in no other animals at all.

The corresponding parts are named in the figures in such a way as to render their agreement tolerably clear. . .

It is clear then that the Ascidians must be admitted to be Vertebrates, and must be classified in that great sub-kingdom or branch of the animal pedigree. The Ascidian tadpole is very unlike its parent the Ascidian, and has to go through a process of *degeneration* in order to arrive at the adult structure . . . It will be observed, that in somewhat the same manner as the young barnacle, the young Ascidian fixes itself to a stone by its head; then the tail with its notochord and nerve-chord atrophies. The body grows and gradually changes its shape, whilst the cloacal chamber forms. The brain remains quite small and undeveloped, and the remarkable myelonic eye (the eye in the brain) disappears. The number of gill-slits increases as the animal grows in size and its outer skin becomes tough and leather-like.

Science News Letter, June 3, 1933

AGRICULTURE

U. S. Wheat Crop To Be Shortest in Generation

WINTER WHEAT in the United States promises the shortest crop since 1904, the May issue of Wheat Studies of the Food Research Institute estimates. The official forecast as of May 1 indicated a crop of only 337 million bushels, 125 million below the standing estimate of last year's crop. Acreage abandonment was unprecedentedly high, over 32 per cent., leaving the smallest area for harvest since 1912.

Reports of farmers' intention to plant spring wheat indicated that the acreage sown this spring in North America may be four or five per cent. smaller than the area planted in 1932. Since the publication of the Institute's report, unfavorable weather has held back spring wheat planting, along with practically all other crops, so that some shortage in spring wheat may be expected also, though whether it will be as great as that in winter wheat cannot be predicted at present.

One major wheat harvest of the world, that in India, has already been reaped, the report states. It is officially estimated at 340 million bushels, a trifle larger than the 1932 crop. It is not expected that the Indian crop will have much influence on world wheat prices during the May-July period. (*Turn Page*)

European wheat-importing countries are still striving for as much self-sufficiency as possible in wheat. They are expected to harvest as large an area as last year's, if not a little larger, but the crop is expected to be smaller by 100 to 150 million bushels. This will be at least partly balanced, however, by a larger crop anticipated from the great wheat-exporting regions on the Danube.

In Russia the area sown to winter wheat was more than four million acres smaller this year than last, and spring wheat plantings will probably be no larger. But even if the crop increases, as is fairly likely, much of the early surplus normally exported will have to relieve the domestic food shortage.

Science News Letter, June 3, 1933

BOTANY

Ever Eat Gum-Jum? Try It In Soup

CHINESE cookery is credited with using weird things, like birds' nests, sharks' fins and exceedingly ancient eggs; but the Chinese are also capable of dishes incorporating real poetry. Dr. A. B. Stout of the New York Botanical Garden describes in an official publication of that institution the use in China of dried flowers of the day-lily, cut up in soup, which he says gives the dish a distinctive and agreeable flavor.

The Chinese names for this commodity are gum-jum, which means golden needles, and gum-tsoy, meaning golden vegetable. New York's Chinatown imports quantities of these dried lilies, as much as two tons having come into the port in one year.

Science News Letter, June 3, 1933

INDIVIDUAL DIFFERENCES IN MENTAL GROWTH

▼ RADIO ▲

by

Dr. Frank N. Freeman

Professor of Educational Psychology at the University of Chicago.

Friday, June 9, at 1:45 p. m. Eastern Standard Time over stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

ORDNANCE

Squeezed Bullets Fired at Mile a Second From New Gun

BULLETS speeding at a mile a second, able at moderate ranges to drive through the tough steel armor plates of tanks, can be fired from a new type of rifle invented by H. Gerlich, an American-born German citizen now resident in England. Because of their potentialities as anti-tank and anti-aircraft weapons, the Gerlich rifle and ammunition are under investigation by the small-arms technicians of the U. S. Army, as well as by several foreign powers.

The Gerlich bullet is something of a paradox. It is of .35 caliber when it goes into the breech of the rifle, and when it comes out of the muzzle it is of only .25 caliber. That means that its diameter has been squeezed down a tenth of an inch as it has travelled through the bore.

This is done by having the bore tapered through a part of its length. The first section forward of the ammunition chamber is cylindrical and of .35 caliber. Then comes a section in which the bore tapers from .35 down to .25 caliber. Finally there is a third section, ending at the muzzle, that is cylindrical and of .25 caliber.

This arrangement enables the bullet to start with a wide area to take the push of the powder gases, and to leave the rifle with a small area, suffering less loss of velocity from air resistance.

To obtain a "compressible" bullet that can be fired from a barrel of this type, Mr. Gerlich fashioned his projectile of .25 caliber, with two flaring bands or flanges of .35 caliber. These fit into the .35-caliber section of the bore, and as the bullet travels down the tapering section they are folded down, fitting into channeled spaces cut into the body of the bullet behind them. The bullet thus leaves the rifle as a smooth cylinder coming to a sharp point at one end, not essentially different from the conventional rifle bullets in common use.

The terrific velocity of 5,000 feet a second, nearly double that of standard army rifles, gives the new weapon several advantages. It naturally flattens the line of flight or trajectory considerably, so that the soldier using it need not trouble himself so much about having the right elevation. It shortens the time of flight from rifle to target, a highly important matter for anti-aircraft machine gunners. Finally, it enables the small-caliber bullet to drive straight through tank armor, even without the advantage of special armor-piercing devices; for at such velocities even soft projectiles have no time to "upset" on striking a hard target—they act like the straws that get driven through boards in a tornado.

All these advantages must of course be purchased at a price. The rifle barrel, with its somewhat complicated bore, is more difficult to make, and more expensive. The ammunition is considerably costlier also, and its greater bulk in transportation is something of a military disadvantage. The recoil is heavier. Whether the rifle will wear out faster under firing conditions is not yet determined.

Nevertheless, if military authorities see sufficient tactical advantages in the new weapon, its final adoption may be expected.

Science News Letter, June 3, 1933

ENDOCRINOLOGY

Gland Secretion Rescues Children From Dwarfism

SIX CHILDREN and one young man of 18 years, doomed to be dwarfs, were rescued from this fate by treatment with a growth-stimulating hormone from the pituitary gland. Results of the successful treatment are reported by Drs. William Engelbach, R. L. Schaefer and W. L. Brosius of Detroit in *Endocrinology*. Only one other human subject is reported to have received this treatment, a patient of Dr. Engelbach who showed a favorable response.

The young people of the present report ranged in age from 7 to 18 years. They were from about two inches to more than a foot shorter than the shortest height normal for children of their ages. One seven-year-old girl was only one inch taller than her three-year-old sister.

Examinations showed that the growth deficiency was due to deficient functioning of the pituitary gland. Some of

the patients also showed signs of deficient thyroid gland activity.

The patients grew from one to 2.7 inches when given the growth-stimulating hormone three to five times a week for periods varying from three to five months. The young patients had all been under observation for several months prior to treatment, during which time six of them did not grow at all, while one grew half an inch.

The Detroit physicians make a special plea for early recognition and treatment of these cases. This will materially improve the chance for successful outcome of the treatment.

Science News Letter, June 3, 1933

MEDICINE

Hayfever Caused by Molds From Dust and Ringworm

MOLDS may cause hayfever and other nasal disturbances, Drs. Harry S. Bernton and Charles Thom of Washington have discovered.

Eight cases characterized by sneezing, running or stuffy noses were caused by sensitiveness to two species of molds, these scientists found. One of the molds, *Alternaria* by name, is commonly found in dust. The other, *Trychophyton,* is a common parasite of man and animals and produces ringworm of the scalp. Contact with persons who have ringworm or are otherwise infected with these parasites may cause hayfever in a sensitive person, it appears.

Fortunately, the sensitive individuals can be desensitized by suitable treatment, which relieves the symptoms. Six of the eight patients have been under treatment long enough to show permanent relief, Drs. Bernton and Thom reported to *The Journal of Allergy.*

Allergy is the name scientists have for the condition of sensitiveness to certain proteins, found in either food, plant pollens, or such substances as horse dander, cat hair or molds.

Asthma may also be caused by molds, earlier investigations of Dr. Bernton's showed.

The hayfever due to molds may appear at any season or in any locality. It is the hayfever due to plant pollens that causes summer sneezes and discomfort. One case of mold hayfever was seen in a boy who had been troubled with this ailment for a period of eight years in the West Indies, China, Japan, the Philippine and Hawaiian Islands, California and the District of Columbia.

Science News Letter, June 3, 1933

GENETICS

Genes Declared Impotent as Major Evolutionary Factors

THE THEORY of the gene, cornerstone of the present-day science of genetics, was attacked by Prof. William E. Castle of the Bussey Institute of Harvard University, in an address before the American Society of Mammalogists.

This theory, which holds that all inherited traits and qualities are controlled by the action of separate physical units of submicroscopic size borne in the chromosomes, Prof. Castle said failed to account for many observed facts about the way animals actually transmit in heredity. And present-day concepts in genetics, he continued, give us little help with the riddle of evolution.

"No genes are known," declared Prof. Castle, "which, by mutation, would change a rabbit into something different from a rabbit, which would take it out of its genus, or class, or phylum. Such mutations do not occur, and we know nothing about the inheritance of these more general features of organization, yet inherited features they certainly are. The current theory of the gene assumes that these characters, as well as the more special known unit-characters, are influenced by chromosomal genes. But this is purely speculative. No direct evidence can be cited in its support, for no crosses can be made between animals which have and those which have not these general characteristics, and that is the only method of Mendelian analysis.

"Genetics accordingly can not solve the problem of evolution, which involves changes in organization more general and fundamental in character—but probably slower and more gradual in becoming established—than those controlled by chromosomal genes."

Prof. Castle's special studies have been with rabbits. Of sixteen definitely traceable unit character differences in these animals, nine affect color and five the structure of the coat. Each of these effects is due to a different chromosomal gene; but gene mutations determine special and inconsequential properties, and have no effect on the rabbit as a species.

Science News Letter, June 3, 1933

BIOLOGY

Shipworms Proving Destructive to Rope

SHIPWORMS or teredos, a type of mollusks exceedingly destructive to pilings, boats and other wooden structures exposed to sea water, have developed a new and annoying appetite in Long Island Sound, Prof. W. R. Coe of Yale University reports in *Science.*

They have taken to boring in the stout ropes with which buoys and boats are moored, and have caused more than a little destruction and annoyance. Their greediness proves their own undoing, however, for as soon as they have riddled a rope to the point where it falls to pieces they are turned loose unsheltered in the sea, and so perish.

Science News Letter, June 3, 1933

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PHYSICS

Cosmic Ray Energy Difficult to Measure

DIFFICULTY in measuring the energy of cosmic rays presents the greatest problem to the physicists studying them, Dr. R. A. Millikan declared in a discussion at Pasadena, Calif., following a summary of recent experiments presented by his colleague in the California Institute of Technology's cosmic ray research, Dr. H. Victor Neher.

Dr. Paul S. Epstein presented a very successful theory which pictured the cosmic rays as a stream of photons accompanied by several weaker groups of electrons. But the experimenters were warned against accepting theories until energy measurements of the rays became more complete.

Meanwhile, all the investigations indicate that photons predominate in cosmic rays but that some electrons also enter the earth's atmosphere.

A strong support for the photon idea was presented by Dr. Carl D. Anderson, who announced that he had produced positive electrons or positrons with photons from thorium. If photons are known to produce positrons and if no other method is known then the positrons which are found with cosmic rays were probably produced by photons.

Thus the point of view which has long been urged by Dr. Millikan is considered still the most plausible description of cosmic rays.

Science News Letter, June 3, 1933

GENERAL SCIENCE

Idealism Reigning, Says Jeans in New Book

IDEALISM, the view of nature that sees mechanical concepts continually giving place to mental, is reigning in the physical world of science, as interpreted by Sir James Jeans, the eminent British astronomer-physicist, in his latest book, The New Background of Science (Macmillan).

He describes recent progress in physical science "as resulting from a continuous emancipation from the purely human point of view."

It would be interesting to eavesdrop on a chat between Sir James Jeans and Sir Isaac Newton if time could be so distorted that such a meeting could take place. For it was Newton's *Principia* in which the mechanistic view of nature was first put forth in perfect logical form and Sir James contrasts the beginning of the *Principia* written in 1687 with the beginning of Dirac's Quantum Mechanics, written in 1930, to show that mechanistic determinism is passé.

So the idealist or mentalist seems to be on the top of the intellectual heap these days, and the realist or materialist is distinctly out of favor.

Sir James in his book gives an extremely understandable review of the present situation in theoretical physics which has just undergone a succession of kaleidoscopic changes. Those who still insist on believing what they see, those raised in the materialistic world of one, two and three decades ago, will find it a road map to new conceptions.

What of the future? Sir James writes: "Idealism has always maintained that, as the beginning of the road by which we explore nature is mental, the chances are that the end also will be mental. To this present-day science adds that, at the farthest point she has so far reached, much, and possibly all, that was not mental has disappeared, and nothing new has come in that is not mental. Yet who shall say what we may find awaiting us round the next corner?

Science News Letter, June 3, 1933

BIOPHYSICS

One-Celled Animals Shine Under Ultraviolet Light

ULTRAVIOLET light causes one-celled animals to shine with a ghostly visible light, which changes its color according to the wavelength of the ultraviolet with which they are being rayed. Experiments bringing out these points are reported by A. C. Giese and Prof. P. A. Leighton of Stanford University in *Science*.

The light given off by various organic substances as well as by living cells and tissues when rayed with ultraviolet is known technically as flouresence. It is not a reflection effect, but is due to the excitation of the molecules in the substances, causing them to shine with a light of their own.

Mr. Giese and Prof. Leighton discovered that the ability of their organisms to fluoresce did not necessarily cease at death. Depending on the cause of death, some became non-fluorescent, but others retained their ability to shine under the ultraviolet. One lot of the organisms dissolved into the water as they died, and the entire fluid then fluoresced.

Science News Letter, June 3, 1933

NATURE RAMBLINGS by Frank Thone

ECOLOGY

Children of the Cold

HERBS are children of the cold. That vast army of non-woody plants, including the highly important grasses, such vegetable staples as potatoes, tomatoes, cabbages and carrots, as well as such ornamentals as violets, tulips and peonies, belong to times and climates that supply alternations of summer and winter. Herbs are relatively less abundant in the tropics than they are in the temperate zones, says Prof. William B. Scott of Princeton University; and in past ages, when the earth had a mild climate from pole to pole, there is little evidence in the fossil record that herbs were plentiful anywhere.

Until winters came, woody plants were the rule. And why not? A plant that dies at the end of the growing season, whether it perishes altogether as annuals do, or merely withers back to the root, as perennials and biennials, thereby gives up all the advantage of height it has gained during the summer. When the next season begins, it must start again from the ground level, while its woody companions can start from the top buds of their highest branches. That gives the woody plants an overwhelming advantage in the yearly race for a place in the sun. Thus it is that in all tropical lands you will find woody plants dominating: as dense forests of vine-draped tall trees where there is water enough, as thickets of shrubs in desert and semi-desert lands.

Even in our own cooler lands, the regions with most moisture will develop a high proportion of trees and shrubs, as compared with the non-woody plants.

Science News Letter, June 3, 1933

First Glances at New Books

Additional Reviews On Page 352

Physics

THE NEW BACKGROUND OF SCIENCE—Sir James Jeans—*Macmillan*, 301 p. $2.50. See article on p. 350, this issue.

Science News Letter, June 3, 1933

Archaeology

THE LATEST ARCHAEOLOGICAL DISCOVERIES IN ITALY—*Italian State Railways*, 111 p. An archaeological supplement to ordinary Italian guide books, telling of discoveries made within the past few years and bringing to the tourist's attention archaeological discoveries he might otherwise overlook. The little book, paper-backed, is in English.

Science News Letter, June 3, 1933

Psychology

THE FIRST TWO YEARS: VOLUME II, INTELLECTUAL DEVELOPMENT — Mary M. Shirley—*University of Minnesota Press*, 513 p., $3. This study follows the same children with tests, measurements, and records, through the whole of the first two important years of life. The second volume, like the first which dealt with motor development, reveals an orderly sequence in human development that is consistent from child to child, however much individuals may differ in the speed with which they reach the various stages of progress. Excellently illustrated, comprehensive, and clear.

Science News Letter, June 3, 1933

Paleontology

EAGLES AND EAGLE-LIKE VULTURES OF THE PLEISTOCENE OF RANCHO LA BREA—Hildegrade Howard — *Carnegie Institution*, 82 p., 29 pl., paper $2.50, cloth $3.50. A monograph of unusual interest and importance on one of the most complete fossil avifaunas known.

Science News Letter, June 3, 1933

Psychical Research

HUMAN EXPERIENCES, PART SECOND (A)—*Boston Society for Psychic Research*, 104 p, $1. Bulletin XX is continued from Bulletin XIV and contains more of the statements of individuals listed in Who's Who in America regarding instances of purported telepathic communication.

Science News Letter, June 3, 1933

Psychical Research

MAINLY ON PHYSICAL PHENOMENA—Editor, W. F. Prince—*Boston Society for Psychic Research*, 78 p., 75c. Dr. Prince has become weary of the obstructions placed in the path of those who are trying, with scientific detachment, to investigate mediumistic physical phenomena. If psychical researchers will now join hands in demanding that principles of scientific research be applied to this field, Dr. Prince declares that "it is possible to make more progress toward a concensus of certitude in a single year than has been made in the past seventy years."

Science News Letter, June 3, 1933

Ornithology

BIRDS YOU SHOULD KNOW—Thornton W. Burgess—*Little, Brown*, 256 p., $1.25. A handy pocket-size book about birds by one of the best-known of our nature writers. Abundantly illustrated.

Science News Letter, June 3, 1933

Economics

HUMAN GEOGRAPHY OF THE SOUTH Rupert B. Vance—*Univ. of North Carolina Press*, 596 p., $4. All who look ahead to the country's future—including, of course, every intelligent son of the South—should not be without this comprehensive survey, described in subtitle as a study in regional resources and human adequacy. A 67-page bibliography will be appreciated by those who wish to delve further into the geography, history and economics of the section. The volume closes with the plea that regional planning take a hand in orienting the trends of the future to the best interests of the whole South.

Science News Letter, June 3, 1933

Ethnology

THE COMPARATIVE ETHNOLOGY OF NORTHERN MEXICO BEFORE 1750—Ralph L. Beals—*Univ. of California Press*, 225 p., $1.35. Summarizes the most important of the available data on northern Mexico, and brings out significant points of likeness with Southeastern and Southwestern cultures. Considering that this region chosen for the study is important and yet has been singularly neglected, Mr. Beals' monograph should be very useful to Americanists.

Science News Letter, June 3, 1933

Economics

WHOLESALE PRICES FOR 213 YEARS, 1720 to 1932—G. F. Warren, F. A. Pearson, and H. M. Stoker—*Cornell University*, 222 p., free. A technical bulletin.

Science News Letter, June 3, 1933

History

EARLY EUROPEAN CIVILIZATION—Hutton Webster—*D. C. Heath*—768 p., 296 illus., $2.12.

MODERN EUROPEAN CIVILIZATION Hutton Webster—*D C. Heath*, 795 p., 254 illus., $2.12.

It is a long road from the old-fashioned school book with its parade of kings and its endless succession of battles to these new high school texts. The student is now taught that history is the story of civilization. The daily life of the Athenian is as important to know as the date of Marathon. History, the student is told, enables us to understand our own age in the light of the past out of which it grew. Sometimes, the point of view engenders text books which are chatty but not comprehensive. Dr. Webster has avoided this pitfall. His two texts offer a "liberal education" in history from Stone Age man down to 1932.

Science News Letter, June 3, 1933

Horticulture

SUBSISTENCE GARDENS—W. E. Georgia and C. B. Raymond—*Cornell University*, 18 p. A pamphlet of practical suggestions and plans for victims of the depression who have access to a bit of land.

Science News Letter, June 3, 1933

Statistics

THE OCCUPATIONAL PROGRESS OF WOMEN, 1910 TO 1930—Mary V. Dempsey—*Govt. Print. Off.*, 90 p., 10c. Bulletin No. 104 of the Women's Bureau, U. S. Department of Labor. Domestic service still holds first place as the occupation employing the greatest number of women. School teaching has advanced from fourth place in 1910 to second place. Stenography and typing has moved from eighth to third place. We have fewer women farm laborers, dressmakers, milliners, and home laundresses.

Science News Letter, June 3, 1933

Psychology

DEVELOPING ATTITUDES IN CHILDREN—*University of Chicago Press*, 156 p., $1.50. The proceedings of the Midwest Conference on Developing Attitudes in Children of the Chicago Association for Child Study and Parent Education, held in March, 1932.

Science News Letter, June 3, 1933

•First Glances at New Books

Additional Reviews On Page 359

Forestry

A NATIONAL PLAN FOR AMERICAN FORESTRY—*Govt. Print. Off.*, 1677 p., $1.75. This two-volume report (Senate Doc. No. 12) constitutes the groundwork of the vast scheme for a long-time program of national planning in the re-establishment of our forests. With the known predilection of the President for forestry, it is to be expected that the matters discussed in these books will be continually to the fore during the coming four years or more, so that any study group, whether of students or of adults, interested either in public affairs or in the natural sciences, will certainly want to have them on the reference shelf.

Science News Letter, June 3, 1933

Biology

THE SCIENCE OF HUMAN REPRODUCTION: BIOLOGICAL ASPECTS OF SEX—H. M. Parshley—*Norton*, 319 p., $3.50. Professor Parshley presents this complex subject in a remarkably clear and simple manner. While he discusses the biology of sex primarily, he does not neglect the psychological and social aspects. There is a chapter on population and eugenics and another on the biology of sex behavior. The book can be unhesitatingly recommended to anyone wishing to learn the facts of sex and reproduction. There is a well-selected bibliography.

Science News Letter, June 3, 1933

Pathology

A HANDBOOK OF EXPERIMENTAL PATHOLOGY—George Wagoner and R. Philip Custer—*Charles C. Thomas*, 160 p., $4. Designed for students of experimental pathology, this book is based on the course given to second-year medical students in the University of Pennsylvania. Too technical for the lay reader.

Science News Letter, June 3, 1933

Botany

BIBLIOGRAPHY OF OHIO BOTANY—Ethel M. Miller—*University of Ohio*, 96 p., $1.

Science News Letter, June 3, 1933

History

THE CLASSICAL WORLD—William Longyear—*Silver, Burdett*, 19 by 25 inches, 60c. A picture map of the classical world, done in soft blue and tan with attractive pictures to mark historic spots. The map is prepared primarily for users of first and second Latin books in the Climax Series, but would brighten any classroom where Latin or the history of Rome is taught. Usefulness has been kept in mind by the artist, who has refrained from too many pictures and therefore found plenty of room to locate the numerous important battle sites, tribes and important cities.

Science News Letter, June 3, 1933

Psychology

CHILD PSYCHOLOGY—Buford J. Johnson—*Thomas*, 439 p., $4. This comprehensive book holds something of interest to parents, teachers, psychologists, and mere observers of human nature, alike. It is based on the author's rich experience with children, particularly in the Child Institute of the Johns Hopkins University and on her knowledge of what other experimenters have recently found in observing child behavior. Striking illustrations add to the attractiveness of the volume.

Science News Letter, June 3, 1933

Education

THE ART OF EDUCATIONAL RESEARCH—Harold H. Abelson—*World Book Company*, 332 p., $2. A textbook for students of education. Some of the chapters should be of interest to any student engaged in research and the reporting of it.

Science News Letter, June 3, 1933

Ornithology

BIRDS OF YOSEMITE—M. B. Beatty and others—*Yosemite Educational Department*, 22 p. A special issue of *Yosemite Nature Notes* which constitutes a handy reference booklet for visitors to this great National Park.

Science News Letter, June 3, 1933

Biology

EDUCATIONAL BIOLOGY—W. H. Atwood and E. D. Hess—*Blakiston*, 475 p., $2.75. Second edition of a successful school text.

Science News Letter, June 3, 1933

Biology

EXERCISE BOOK IN HIGH SCHOOL BIOLOGY—J. Glenn Blaisdell—*World Book Co.*, 167 p., 72c.

Science News Letter, June 3, 1933

Archaeology

GYPSUM CAVE, NEVADA—Mark Raymond Harrington—*Southwest Museum*, 197 p., 19 pl., 77 figs., $2.50. Gypsum cave is now famous in American archaeology for its evidence that man lived in America in the days of the ground sloth and other extinct fauna. Mr. Harrington's report of his expedition, now published in the Southwest Museum Papers, is full and complete. It is interesting to find that he sets a rough estimate of 8,500 B. C. as the age of the Gypsum Cave man, and places him as a Late Solutrean or Post-Solutrean in culture.

Science News Letter, June 3, 1933

Economics

INDUSTRIAL MANAGEMENT IN THE MACHINE AGE—Francis A. Westbrook—*Crowell*, 407 p., $3.50. A very readable story of the application of the common sense methods of science to management. The many first hand examples of the accomplishments of industrial management given by Mr. Westbrook extend the appeal of this volume beyond those who will read it simply because of academic or professional interest.

Science News Letter, June 3, 1933

Geology-Anthropology

THE GEOLOGY OF THE WEICHANG AREA—P. Teilhard de Chardin, 49 p., 1 map; THE LITHIC INDUSTRY OF THE *SINANTHROPUS* DEPOSITS IN CHOUKOUTIEN—P. Teilhard de Chardin and W. C. Pei, 42 p., 3 pl.; SKELETAL REMAINS OF *SINANTHROPUS* OTHER THAN SKULL PARTS—Davidson Black, 4 p., 2 pl. These three reprints from the Bulletins of the Geological Society and the Geological Survey of China give useful background for the *SINANTHROPUS* discoveries.

Science News Letter, June 3, 1933

Hygiene

HEALTH STORIES, BOOK ONE—Anna B. Towse & William S. Gray—*Scott, Foresman*, 144 p., 60c. A health reader for first grade, illustrated in colors. The stories seem as if they would be more than usually attractive to the child.

Science News Letter, June 3, 1933

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